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of the treatise is devoted to the tracing of tribes (Stämme) by means of their bows and arrows.

Meyer's map will be a revelation to any student of South American ethnology. Brinton has traced the Arawak from the Paraguay river to the Bahama Islands. Long ago I was struck with South American characteristics upon wood carvings from Turk's Island and among tribes of the Southern States. Holmes draws attention to peculiar pottery marks from the South in the Gulf States, and Meyer shows that the region of the Matto Grosso northward was a *cloaca gentium*, especially the common sources of the Paraguay, the Shingu and the Tapajos and the lower courses of the Tapajos, the Madeira and the Negro. The Negro is joined to the Orinoco by the Cassiquiare, and from the mouth of the Orinoco to Florida is an unbroken chain of inviting islands. Dr. Brinton denies that the Carib stock passed far north into the Antilles, but there seems to have been an easy and much-frequented highway from the Paraguay as well as from Yucatan to Florida for peoples. In this connection von den Steinen, Ehrenreich and Im Thurn must not be neglected.

O. T. MASON.

SCIENTIFIC LITERATURE.

FOSSIL PLANTS OF THE WEALDEN.

The Wealden Flora. By A. C. SEWARD, M. A., F. G. S. Part I.—*Thallophyta-Pteridophyta*, London, 1894. Part II.—*Gymnospermæ*, London, 1895. Catalogue of the Mesozoic Plants in the Department of Geology, British Museum (Natural History). Parts I., II.

The second part of this important work has come to hand. The first part appeared in June, 1894, but as Part II. was expected even earlier than it arrived no review has appeared in America of Part I., and the whole work may now be treated together. An additional part is promised, which will embody certain critical discussions, but as no plants have been found in the English Wealden of higher rank than the Gymnosperms these two parts must contain an enumeration of the entire flora so far as known.

At the time of receiving the first part I was about starting for Europe, and while there I made some investigations in the Wealden with

a view to comparing that formation with the Potomac of the United States. I was therefore able to make excellent use of the information it contained when preparing a paper on 'Some Analogies in the Lower Cretaceous of Europe and America' for the Sixteenth Annual Report of the U. S. Geological Survey (pp. 463-542), chiefly growing out of the observations I had made. That paper is now in press, but it might have been made much more complete if I had received Part II. of this work in time to make use of it. As I have expressed in that paper my appreciation of the important information contained in Part I., and have embodied a considerable part of it in the comparisons there instituted between the Wealden flora and that of the Potomac formation, it is not necessary to go into detail relative to this portion of Mr. Seward's work. Its title sufficiently indicates its scope; thirty distinct forms are treated, the greater number of which are ferns. There are two algæ, one Chara, one hepatic and three species referred to Equisetites. Nine of the forms have more or less geographical distribution outside of England, and a table is given showing this.

It may be said of the whole work that, although constituting, as the title page indicates, the beginning of a catalogue of the Mesozoic plants in the British Museum, it is much more than a catalogue. All the material in the Museum has been carefully revised, and though treated somewhat by number it is dealt with in a systematic way, and there are many references to similar material in other museums. The literature of the subject is also fully given, and all new material is described and named. There is a large amount of this latter, the greater part of which has been collected by Mr. P. Rufford, of Hastings, for whom many species and one genus have been named. Many of the old specimens collected by Mantell and the early geologists have been thoroughly worked over and referred to modern genera, so that we now have some idea of the real nature of such objects as *Endogenites erosa*, which is shown to be a fern (*Tempskya Schimperii* Corda), while the old genera Pecopteris, Alethopteris, Lonchopteris, and most of Sphenopteris have been brought within the Mesozoic genera, Matonid-

ium, *Cladophlebis*, *Weichselia* and *Ruffordia*. Anyone who has had to deal with these old names can realize the importance of Mr. Seward's work.

In Part II., so recently published and to which it is proposed chiefly to draw attention, Mr. Seward has taken up the Gymnosperms, which, as already remarked, are the only Spermatophytic or Phanerogamic plants which have, as yet, been found in the Wealden. These all belong to the two orders Cycadaceæ and Coniferæ, unless we suppose, as Mr. Seward seems to do, in common with most other authors who have studied that group, that the Bennettitæ constitute an order distinct from and intermediate between the Cycadaceæ and the Coniferæ.

Mr. Seward has devoted considerably more than half his space to the Cycadaceæ in the wider sense, and, although the number of forms is not large, still the great difficulty that attends the study of this class of material, as well as the importance that such a study has, both for biology and geology, fully justifies the thoroughness of his treatment. In view of the recent importance which the subject of cycadean vegetation has assumed in America, this able and excellent review of it by so competent an authority as Mr. Seward is in a high degree timely and valuable.

Although he gives the opinion of the leading investigators, Carruthers, Solms-Laubach, etc., to the effect that the Bennettitæ cannot be placed in the Cycadaceæ, still he does not himself make this distinction in the work before us, and treats all the forms that have been commonly referred to the Cycadaceæ under that ordinal name. His subdivision is mainly into *Frondes*, *Trunci* and *Flores*, and in addition to these he deals with several doubtful organs and with numerous seeds (Carpolithes).

One of the most valuable parts of the work is an extended discussion of the fossil Cycadaceæ, occupying twenty pages. He first goes over the evidence for the existence of this family in Paleozoic beds, and the conclusion is decidedly in favor of such a view, with, however, the qualification that the Paleozoic Cycadaceæ are more or less synthetic in their nature and possess marked relationships with less highly developed groups and especially with ferns. I know of no other

place in which the proof of the Pteridophytic ancestry of the Cycadaceæ in particular and of the Gymnosperms in general has been so ably marshaled. It constitutes another step in the general march of botanical science towards the breaking down of the barriers which formerly so completely separated the Cryptogams from the Phanerogams. Only those narrow systematists who are chiefly in search of differences, and who so dread to encounter resemblances, can regard this in any other light than that of true scientific progress.

Of the forms which are known only by their fronds Mr. Seward recognizes six genera and fourteen species in the English Wealden. The genera are: *Cycadites*, *Dioonites*, *Nilssonia*, *Otozamites*, *Zamites* and *Anomozamites*. Of these *Otozamites* is represented by six species and varieties, *Cycadites*, *Dioonites* and *Zamites* by two each, while of *Nilssonia* and *Anomozamites* only one species of each has been found thus far. Four of these forms are described as new, two of which, *Cycadites Saportæ* and *Zamites Carruthersi*, have the rank of species, the other two new forms being varieties of the old species *Otozamites Klipsteinii* Dunk., of the German Wealden. The remainder of the fronds are identified with species long since recognized either by the earlier English or by Continental authorities.

Each of these genera and many of the species are carefully discussed and a somewhat extended synonymy is appended. Numerous changes are also made, of which only one need be mentioned, viz., the adoption of Schenk's view of the form which has so long gone by the name of *Dioonites Buchianus* (Ett.) Born., and its reference to the genus *Zamites*. This has special interest for the American paleobotanist, because it is one of the most abundant forms in the oldest beds of the Potomac formation. This form was first supposed (Göppert, 1847) to belong to *Pterophyllum*, and its provisional reference to *Dioonites* by Bornemann in 1856 would have received little attention had it not been adopted by Schimper in his *Traité de Paléontologie Végétale*, and its reference to Miquel's genus *Dioonites* has always been doubted by some authors. The last change was that of Nathorst, who, recognizing its affinities with

Zamia rather than with *Dioon*, proposed in 1890 to call it *Zamiophyllum*. This is in harmony with Nathorst's fundamental principle of nomenclature to make all doubtful genera founded on leaves terminate in *-phyllum*. Objectionable as this rule is in the case of dicotyledonous leaves (see Amer. Journ. Sci., 3d Ser., Vol. XXXI., May, 1886, pp. 370-375), it is still more so for plants of lower rank, as monocotyledons, while in families in which the appendicular organs are not true leaves, but fronds, as in the case of cycads and ferns, this practice is highly objectionable, and it is matter for congratulation that Mr. Seward, in recognizing the same truth perceived by Nathorst, has restored Schenk's name. Apropos of this form it is to be noted that Mr. Seward declines to recognize Prof. Fontaine's two varieties from the Potomac formation and Nathorst's variety from Japan, and that he also includes in this species the other Japanese form to which Nathorst gave the name *Zamiophyllum Naumanni*.

Passing over many other interesting features of this portion of the work and also his treatment of flowers and fruits, we come to the section which, just at present, has the greatest interest for the student of American paleobotany, viz., that which treats of the cycadean trunks. It is no secret that a monograph on the Cycadean Trunks of North America is in preparation at the U. S. National Museum, and that a large amount of material, especially from the Potomac of Maryland and the Lower Cretaceous of the Black Hills, has been brought together as a basis for this study. Several preliminary notes and papers have already appeared,* bearing on this subject, but unavoidable delays have prevented the progress of the work, and it will be some time before its completion. This much is said because Mr. Seward has several times referred to the probable early appearance of this monograph (see Pt. II., pp. 120-121 of the work under review). One of the causes of delay was the necessity which was felt of visit-

ing the European museums and examining the great collections of cycadean trunks in England, France and Italy. The paper above referred to* gives a somewhat full account of the investigation of this nature which was made in 1894.

In restricting the Wealden to the beds that lie between the Purbeck and the Atherfield beds (he seems to include the Lower Greensand) Mr. Seward has excluded from the consideration of cycadean trunks the oldest and best known forms, viz., those from the 'dirt beds' (Purbeck) of the Portland quarries, first described by Buckland in 1828 under the name of *Cycadeoidea*. The number of distinct forms confined to the true Wealden is not large and Mr. Seward has treated them under the generic names *Bucklandia*, *Fittonia*, *Bennettites* and *Yatesia*. *Bucklandia* includes certain cylindrical trunks of considerable height in proportion to the diameter, the most important being *B. anomala* (Stokes & Webb) Carr., first described in 1824 as *Clathraria anomala* Stokes & Webb, though previously collected and subsequently treated by Mantell under the name *Clathraria Lyellii*. A large number of specimens of this are in the British Museum, all of which have been examined by Mr. Seward and separately described. There are also some forms exhibiting only the medulla or pith, which Mr. Seward thinks may belong to *Bucklandia*, but which come under Saporta's designation *Cycadeomyelon*. Two species of *Yatesia*, one of which is the *Y. Morrisii* of Carruthers, are also enumerated, but Mr. Seward seems to have grave doubts as to whether this genus can properly be separated from *Bucklandia*. A new species of *Fittonia* from Mr. Rufford's collection is described, but scarcely any mention is made of the original species *F. squamata* Carr., because it is in the Geological Museum on Jermyn street. It is a pity that this work should not have sufficiently expanded to include all the material from the Wealden, seeing that so nearly all is actually in the British Museum.

We come now to that form which is certainly of the greatest interest from whatever point of view, viz., the genus *Bennettites* of Carruthers,

*See SCIENCE, Vol. XXI., June 30, 1893, p. 355; Proc. Biol. Soc. Washington, Vol. IX., April 9, 1894, pp. 75-88; Journ. Geol., Vol. II., April-May, 1894, pp. 250-266; Bull. Torr. Bot. Club, Vol. XXI., July 20, 1894, pp. 291-299.

*Sixteenth Annual Report U. S. Geol. Surv., 1894-'95, pp. 463-542, pl. xcvii-cvii.

upon which has been founded a distinct order Bennettiteæ. This is not the place to go into a full discussion of the important characters which distinguish this form. They have been fully considered by Carruthers, Solms-Laubach, Saporta and Lignier. Mr. Seward sums them up with characteristic conciseness and refers to this genus six or seven distinct forms including the *B. Saxbyanus* and *B. Gibsonianus* of Carruthers. Solms-Laubach, it will be remembered, confined the genus to the latter of these species solely on the ground that the remarkable trunk found on the Isle of Wight and so fully illustrated by Carruthers is the only one in which the included seeds are clearly shown. The remaining species he preferred to place in Buckland's old genus *Cycadeoidea*. Since the publication of Lignier's interesting researches upon the structure of *B. Morierei*, the opinion has gained recognition that there is a close relationship between the genus *Williamsonia* and *Bennettites*. Mr. Seward fully discusses this in an extended introduction to a new species collected by Mr. Rufford in the Fairlight clays near Hastings, which he names *Bennettites (Williamsonia) Carruthersi*. This species is represented by no less than seventeen specimens, and in addition to this there is a variety (*latifolius*) of which some dozen specimens occur. These all come under the head of *Flores* or floral organs, which are carefully illustrated in two plates and one text figure. Some of these forms certainly resemble those referred to *Williamsonia* from the Potomac formation; others, it must be admitted, can scarcely be separated from the specimens so fully illustrated by Lignier, while still others seem to be substantially identical with those figured so long ago by Young and Bird from the Yorkshire Oolite and subsequently treated by Williamson under the name of *Zamia gigas*. Carruthers recognized the undesirability of referring such forms to the genus *Zamia*, and therefore founded the genus *Williamsonia*.*

So far as known at the present writing, none of the cycadean trunks of America reveal the presence of the included fruits characteristic of *Bennettites Gibsonianus*, but in all other impor-

tant respects these trunks resemble those which Mr. Seward refers to this genus, and also all those which Count Solms-Laubach would include under the name *Cycadeoidea*. So far as their general appearance is concerned, both the American and the Italian forms depart from the original type of Buckland more widely than from the Bennettitean trunks of the Wealden. The fact that Count Solms appears to have found included anthers in the great Italian trunk *Cycadeoidea etrusca* seems to indicate that throughout this great group of closely similar forms the reproductive organs were the same, and that the failure to find fully developed seeds in the interior of most of these trunks is due to defective preservation. It is not probable that these seeds could long remain thus imbedded in the cortex; they must have possessed some mode of extrusion, and it must have been a rare accident that a trunk should be entombed at the precise time when its mature seeds were still included. This seems to have been the case with *B. Gibsonianus*—a most happy accident for science. But in most other specimens, and especially in many of the American, there are indications within the floral axis of the remains of former organs that have disappeared. In some specimens these flowers closely resemble the one studied by Lignier, and the enveloping bracts are either still preserved or else are indicated by definite cavities having the same form. It therefore seems at least a reasonable conclusion that most or all of the trunks referred to *Cycadeoidea* by Solms-Laubach are of practically the same nature as *Bennettites Gibsonianus*. Further investigations now in progress are likely to throw additional light upon this subject.

One other supposed cycadean trunk described by Mr. Seward is of special interest because it is that upon which was formally founded the *Dracæna Benstedii* Koenig, which occurs so often in the books. We have here at last the history of this problematical form, first mentioned by Mantell as having been discovered by Bensted at Maidstone and supposed by him to be related to *Yucca* or *Dracæna*. Koenig, who was keeper of the Mineralogical Department of the British Museum where the specimens were, seems to have labelled them by this name, and

*See SCIENCE, N. S., Vol. II, No. 32, August 9, 1895, p. 147.

Morris in his Catalogue of British Fossils, perpetuated it. Mr. Seward has examined the specimens and finds them to be in all probability cycadaceous, but he unfortunately declines to apply to them either a generic or specific name. This disposes of the last claim of the British Wealden to any monocotyledonous vegetation, the old *Endogenites erosa* having been long since referred to the ferns.

The coniferous vegetation of the Wealden is only second in importance to its cycadean vegetation. It is not as well preserved and there is no doubt much truth in Mr. Seward's remark that "as a general rule, fossil conifers are perhaps the most unsatisfactory plants with which the palæobotanist has to deal; structureless and imperfectly preserved fragments of broken twigs, isolated cones, leaves or seeds, have usually to be determined separately, and it is only in comparatively rare instances that we are in a position to connect cones and vegetative branches."

Sixteen distinct forms are enumerated in this catalogue. They are all referred to the genera *Araucarites*, *Pinites*, *Sphenolepidium*, *Thuites*, *Nageiopsis*, *Pagiophyllum* and *Brachyphyllum*. The largest number of species belongs to *Pinites*, viz., five, while of *Sphenolepidium* there are three, and of *Araucarites*, *Pagiophyllum* and *Brachyphyllum*, two each. It is interesting to note that three of the specimens in the Rufford collection are referred to Prof. Fontaine's Potomac genus, *Nageiopsis*, and Mr. Seward regards them as probably the same as *N. heterophylla* Font. *Pinites* is represented chiefly by cones, which somewhat resemble those of *Abies*, and this is perhaps the most unsatisfactory group of the conifers. The two widely distributed species of *Sphenolepidium*, *S. Kurrianum* and *S. Sternbergianum*, both originally from the Wealden of Germany, and both of which occur in the Potomac formation, are also found in the Wealden of England. Mr. Seward is disposed to include Prof. Fontaine's *S. virginicum* and also his *Athrotaxis expansa* under *Sphenolepidium Kurrianum*. Another species is either the same as or closely related to the *Sequoia subulata* of Heer, also found in the Potomac formation. It would perhaps not be wholly untrue to regard the genus *Sphenolepidium* as a

sort of connecting link between the Araucarian and the Sequoian types of coniferous vegetation.

A very brief space is devoted to the coniferous wood of the Wealden, and it would seem from the specimens enumerated that there is in the British Museum no material whatever from the celebrated 'pine raft' of Brook Point, on the Isle of Wight. This seems surprising, in view of the great prominence and wide fame of these petrified remains. Only a macroscopic examination seems to have been made of the few specimens from Hastings and Ecclesbourne. This is very disappointing to those who would be glad to avail themselves of the knowledge that could be so easily acquired from this important class of material. If we knew the structure of all the fossil wood of the Wealden of England we should doubtless have a good basis upon which to judge of much of the other material that is so largely in doubt.

The great botanist, Robert Brown, in the early years of the century, examined the internal structure of this fossil wood of the Isle of Wight and reported that it agreed with that of the Norfolk Island pine (*Araucaria excelsa*). No figures were ever published that I can learn. On my brief visit to the island I collected a few specimens, and these have been prepared and slides mounted by Dr. Knowlton. His report upon them is contained in the paper above referred to.*

The Araucarian type of structure is not found in any of the fossil wood of the Potomac formation, but has been found in that of the Lower Cretaceous of the Black Hills. It is the common type of the Older Mesozoic (Upper Triassic) deposits of the Eastern United States. The Potomac wood is all of the Sequoian type, although it has been called *Curpressinoxylon*. Hitherto no plants of that class have been found in the Wealden, but the occurrence of *Sequoia subulata*, or a species closely allied to it, together with the forms of *Sphenolepidium*, seem to mark a transition from the Araucarian to the Sequoian conifers. It may be that the numerous imperfectly preserved cones that have been referred to *Pinites* belong to the same plants whose wood is preserved in the

*Sixteenth Ann. Rept. U. S. Geol. Surv., p. 496, pl. cii., figs. 5, 6 (in press).

Wealden, and this is almost certainly the case with the specimen referred to *Araucarites* (*Conites elegans* Carr. and *Kaidacarpum minus* Carr.). The difference, therefore, in this respect between the Potomac formation and the Wealden may not be as great as was supposed.

My principal object in visiting the Wealden was to see what could be learned of its relationship with the Lower Cretaceous of the United States, and in the paper already twice referred to I have pointed out all such relationships, both stratigraphical and paleontological, that I was able to detect on that brief visit. The general result seems to be that there are marked similarities in both these respects, and that the Wealden formation is like the Potomac, not only in its flora, but also in the manner in which it was laid down. The two seem to form a special epoch in the history of geology, and it may well be that the events which their strata record were in large part taking place at the same time on both sides of the Atlantic.

In reviewing such an important and able work as the one before us, it is greatly to be regretted that there should be anything in it to which a hearty assent can not be given, and it is fortunate that the only part of the book from which anyone could dissent is that which relates to so unimportant a matter as nomenclature, which is regarded by many as of no consequence at all in comparison with the scientific problems that are demanding solution. And yet we can no more dispense with a nomenclature than we can dispense with language. It is in a certain sense the language of science, and as such it should possess all the precision that science requires in all departments. Those who regard it as of no value should not forget that the great Darwin, whom no one can accuse of being a systematist in any sense of the word, considered the subject of nomenclature of such paramount importance that he actually bequeathed a sum of money to be devoted thereto; and all scientific workers, I think, no matter what branch of science they pursue, feel the same need that the language of science and the nomenclature of its innumerable facts, especially in the organic world, be reduced to the most perfect form for their use.

In what I shall say relative to the nomencla-

ture employed in this book, I do not wish to be understood as specially criticising its author, but rather as characterizing, in the most general way, what I regard as a defective system. This peculiar nomenclature is, so far as I am aware, confined to the botanists and paleobotanists of Great Britain and of one or two botanical centers in the United States. In all other branches of science and among botanists of all other parts of the world, no such system is employed, and it is not tolerated except by this restricted class. It is based on the assumption that the author of a name has no more title to that name than anyone else, and that any subsequent author is at liberty to change any name that he regards as 'objectionable.' Of course there is no agreement whatever as to what makes a name objectionable, and therefore in practise it amounts to the right of any author to change any name at will. It is this principle, or, rather want of principle, that has thrown the nomenclature of botany into such inextricable confusion and renders it next to impossible for any writer who has not all the botanical literature of the world before him to decide what is the true name of any genus or species. I will cite only three cases in the present work as fairly illustrative of this point.

On page 173, Mr. Seward creates a new genus *Withamia*, as a 'substitute' for Saporta's genus *Cycadorachis*, given by the latter to forms found in the lower Kimmeridgian, which he believed to represent the rachis of a cycad frond. In making this change Mr. Seward remarks: "Although it is held by some a wrong course to adopt, I propose to substitute, in the case of *Cycadorachis armata* Sap., and the almost identical fossils from the English Wealden, a new generic name in place of that instituted by Saporta. To retain Saporta's genus, with the recently discovered specimens before us, would be practically equivalent to assigning the plant to a position which appears to be entirely at variance with the facts. I propose, therefore, to institute the new genus *Withamia* for these spiny axes with leaf-like appendages, and in doing so to place on record some slight recognition of the immensely important service which Witham of Lartington rendered to paleobotanical science."

I cite this case as an exceedingly moderate one. Probably no better reason could be assigned for changing a name. But what will be the result? Some later author, with better specimens at hand, will think he discovers the relation of these forms with some genus or family, and will therefore again change the name so as to indicate this determination; or he may have no better reason than the laudable wish to do honor to some other eminent predecessor whom he regards as having been neglected, and then we shall have three names for the same thing, and so on indefinitely.

I will cite in the next place, the case of *Yatesia Morrisii* Carr., described on page 166. Here a short synonymy is given with the date of each change placed conspicuously at the left, and the first entry in this synonymy is:

1867. *Cycadeoidea Morrisii*, Carruthers, Geol. Mag., Vol. IV., p. 199.

If the reader turns to the reference given in the *Geological Magazine* he will find a paper by Mr. Carruthers entitled 'On *cycadeoidea Yatesii*, a fossil cycadean stem from the Potton Sands, Bedfordshire.' If I had not happened to have worked up this synonymy I should of course have accepted Mr. Seward's statement, but having done so and arrived at the conclusion that the true name must now be *Yatesia Yatesii* Carr., I was, of course, struck by the discrepancy. It is true that Mr. Carruthers in his subsequent larger paper in the Linnæan Transactions, three years later, at the time that he founded the genus *Yatesia*, had called this from *Yatesia Morrisii*, evidently because he considered that to give Yates's name to both genus and species was 'objectionable.' But why, in giving the synonymy, should not the actual facts be stated, so that the responsibility should rest where it belongs? The entry *Cycadeoidea Morrisii*, Geol. Mag., 1867, is simply a falsification of the record. Although Mr. Seward's synonymy appears upon the face to be carefully prepared, yet such facts as these show that it is not to be trusted, and the reader is compelled in every case to go back to the original and find out whether the entry is correct or not. Clearly such synonymy is far worse than none.

The third and only other case that I shall

cite is that of *Bennettites Gibsonianus* Carr., on page 142. Here ten references are given in the synonymy under the name, representing three changes. Mantell's *Clatharia Lyellii* has, of course, been set aside for proper reasons, and the earliest entry by Carruthers is that of *Bennettites Gibsonianus* in Trans. Linn. Soc., Vol. XXVI., p. 700, 1870. The last entry in Mr. Seward's synonymy is as follows:

1894. *Cycadeoidea Gibsoni*, Ward, Biol. Soc. Washington, Vol. IX., p. 80.

From this the reader will, of course, suppose that the last named author deliberately changed the specific name from *Gibsonianus* to *Gibsoni*, and will hold him responsible therefor. Very few will have before them the little paper quoted, but those who chance to have it will find on the page cited that the first entry under the synonymy is as follows:

1867. *Bennettites Gibsoni* Carr., Brit. Assoc. Rep., 37th meeting, Pt. II., p. 80.

This entry is correct, but is conveniently omitted in Mr. Seward's synonymy. This spelling of the specific name, therefore, has three years priority over the other, and if there were any other test of the propriety of a name than that it is the first one given, the earlier one in this case is the better, because the specimen was collected by Gibson, and the general practice is to employ the genitive form for names of persons who have some immediate connection with the specimen, usually as collector, and the adjective form for those whose connection is remote, and especially where the purpose is merely to honor one who may not be related to the existing case at all. But two reasons are no better than one. The reference to Mr. Carruther's earliest name should, of course, have been given under its proper date, and the last entry should have been:

1894. *Cycadeoidea Gibsoni* (Carr.) Ward. This would have completed the record and satisfied the ethics of the case.

Of course, it may be objected that the name *Bennettites Gibsoni* Carr. was a *nomen nudum*, as no description or figure accompanied it in the note referred to, but the school of botanists to which reference has been made have never troubled themselves with any such refinements in nomenclature as this. Mr. Carruthers pre-

ferred Brongniart's *nomen nudum* *Mantellia nidi-formis* to Buckland's *Cycadeoidea megalophylla*, although the latter was thoroughly described and illustrated and also had priority, as he, himself, admits. In the example before us the last author named is, of course, responsible for referring Bennettites to Cycadeoidea, which, whether correct or not, was a legitimate change and the reasons were given in the paper referred to.

These three cases will suffice to furnish the standard by which the whole is to be judged, and it is obvious that the system of citation adopted in this work, which is simply representative of the whole class of writers referred to, and for which its author should not be held personally responsible, involves both the *suppressio veri* and the *suggestio falsi*. That this should be tolerated in any department of science, the essence of which is truth, is surely beyond the ordinary comprehension.

LESTER F. WARD.

WASHINGTON, D. C.

A Summary Description of the Geology of Pennsylvania. J. P. LESLEY, Harrisburg. Vols. I. and II., 1892; Vol. III. in 2 parts, 1895. pp. 2638 and 611 pl., with an index volume of pp. 98 and xxx.

These volumes, completing the series of Pennsylvania reports, are offered as a digest of about one hundred volumes, averaging not far from two hundred pages each. A review, even a synopsis, is impossible; space admits merely of a notice.

Prof. Lesley's contribution covers the column from the base to the Mauch Chunk of the Lower Carboniferous; failing health compelled cessation of work at that point, and the compilation had to be completed by others. The portion described by Prof. Lesley is found in the most complicated part of the State, and the problems with which he had to deal were numerous and perplexing. The conclusions offered by geologists in adjoining districts were often discordant, and the termination of the survey came too soon to admit of careful re-study of doubtful areas. As a result, the first two volumes of this report contain many defective spots, which the author does not at-

tempt to conceal. The Cambrian and Ordovician, studied chiefly during the early years of the survey, need thorough revision, and the relations of the Pennsylvania Silurian to that of other States are still somewhat obscure. The discussion of the Devonian is careful and as acceptable as any discussion of the Pennsylvania Devonian can be at this time. The numerous deep oil borings in southwest Pennsylvania and West Virginia will afford new material for study of the problems involved. Prof. Lesley's industry is simply appalling; he has mastered the details of the reports in such way as to make them his own, and his portion of these volumes bears his own stamp on every page, so that we have not a mere compilation but a real presentation of the geology as far as the condition of our knowledge warrants. His anxiety to escape the 'error' of the director of the First Geological Survey of the State is shown in the effort to fasten every geologist's name to his work, even, at times, to the extent of crediting to the geologist in charge of a district observations which were only confirmatory of his own made many years before. His readiness to give a hearing to both sides is evidenced not merely by the insertion of an argument, by another, of thirty pages controverting a position strenuously defended by him for more than twelve years, but also by his relegation to the doubtful column of opinions long regarded by him as proved.

The Mauch Chunk west from the Anthracite fields and the Pottsville conglomerate throughout the State are described by Mr. d'Invilliers in Vol. 3, pp. 1833-1915. The synopsis of the labors of Prof. White and others is given clearly and compactly and with a reasonable effort to assign to each author proper credit for his work.

The Anthracite fields are described by Mr. A. D. W. Smith on pp. 1916-2152; this summary appears to be in large part supplementary to the reports and work of Messrs. Ashburner and Hill.

The Bituminous coal fields are described by Mr. E. V. d'Invilliers, on pp. 2153-2588, this description forming the greater part of Vol. III., Pt. I. Mr. d'Invillier's work has been conscientious and successful, so that his

synopsis cannot fail to be useful to geologists as well as satisfactory to the citizens of Pennsylvania, the features of the beds being given in great detail. This synopsis cannot fail to be gratifying, in one sense, to Mr. d'In villier's predecessors in the bituminous fields, for he has made excellent use of their work. But an oversight, doubtless unintentional on Mr. d'In villier's part, cannot fail to detract from the pleasure with which his predecessors should read his synopsis; he has failed to give credit to them in the proper places to such an extent that those who use his work hereafter will be apt to regard him as author rather than as compiler.

The report closes with a review of the New Red, by Mr. Benjamin Smith Lyman, which is a synopsis of his own work and a valuable contribution to the literature of the subject.

The index is quite a marvel in its way. If the purpose of its maker had been to conceal the names of the geologists on whose observations the report is based it could hardly have been more successful along that line. Of the geologists in charge of districts, Dewees, W. G. Platt, Carl and Prime are not mentioned; McCreath, whose chemical work made the survey celebrated, is ignored in the same way. No notice is taken of the work of F. and W. G. Platt, Stevenson and White in the bituminous fields; even Lesley himself is alluded to but once, while the work of one of the compilers requires twenty-six references, that of another five, and that of a third none. The list of publications following the index is even more successful than the index itself, for all of the volumes appear to be anonymous except the two publications by Dr. Genth.

JOHN J. STEVENSON.

Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus, herausgegeben von
PROF. DR. G. HELLMANN.

No. 5. *Die Bauern-Praktik*. 1508. 4°. Pp. 83.

No. 6. *Concerning the Cause of the General Trade Winds*. By GEORGE HADLEY. London, 1735. 4°. Pp. 21.

Facsimiledrucke, mit Einleitungen. Berlin, A. Asher & Co. 1896.

One of the signs that meteorology is now rapidly advancing as a science is the fact that more and more attention is being directed to the ancient writings which marked the first steps in its development. As new discoveries are being made, and as the modern literature of the subject is increasing, we appreciate more fully what the early students and writers did for us, and we are glad to become familiar with their work. The return to the older authors has brought out, during the past two or three years, some interesting translations and reprints of ancient writings on meteorology. The most notable set of such publications is the series of *Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus*, edited by Dr. Hellmann, of Berlin, a very devoted student of meteorology. These reprints are attractively gotten up in rough, white paper covers, and are facsimile reproductions of the originals. Each number contains bibliographical and historical notes prepared by Dr. Hellmann, which is equivalent to saying that they are full, accurate and interesting.

The series of *Neudrucke*, which already included four reprints of old and rare publications, has lately been enlarged by the addition of two more volumes, Nos. 5 and 6. The first, No. 5, is a reprint of *Die Bauern-Praktik*, originally published in 1508 and undoubtedly the most widely known of all meteorological books. The original went through sixty editions in Germany, and was translated into French, English, Danish, Norwegian, Swedish, etc. The weather prognostics and rules of *Die Bauern-Praktik* may be found in the manuscripts of the 10th to 15th centuries, and, in their beginnings, may be traced back much further, even to the days of the Indo-Germanic tribes and to the ancient Chinese. The principal part of the original publication deals with the forecasting of the weather for the whole year on the basis of the weather observed on Christmas and on the twelve days following it. Although, of course, of no practical use to us at the present day, this reprint is of much interest historically to antiquarians and those interested in folk-lore, as well as to meteorologists.

No. 6, of the series, is a facsimile reprint of

Hadley's *Concerning the Cause of the General Trade Winds*, originally published in the *Philosophical Transactions* in 1735. This paper, although very short, was one of very great importance in relation to the theory of the trade winds. Hadley's explanation of the direction of these winds, which he rightly ascribed to the deflective effect of the earth's rotation, was not complete or accurate, yet his theory is commonly found given in many books of the present day. The paper was distinctly epoch-making, and, as such, is well deserving of a place in Dr. Hellmann's admirable series. The notes in the Hadley reprint are as full and as suggestive as in the other numbers.

The publishers of the *Neudrucke* are Asher & Co., of Berlin, but we are informed that Dr. Hellmann has sent over several copies of each of the last two volumes to Mr. A. Lawrence Rotch, Readville, Mass., in order that Americans may be saved the trouble of writing to Europe for them. The reprints may be obtained at cost price on application to Mr. Rotch, the price of *Die Bauern-Praktik* being \$1.75, and that of the Hadley reprint 50 cents.

R. DE C. WARD.

SCIENTIFIC JOURNALS.

PSYCHE, JUNE.

THE body of the number contains but a single short article, in which J. W. Folsom describes and figures a new Thysanuran which he regards as representing a new genus and family, Neelidæ. Two supplements are added, in one of which T. D. A. Cockerell continues his descriptions of new species of bees of the genus *Prosapis*, mostly from Colorado and Nevada; in the other F. C. Bowditch gives a list of 674 Coleoptera found on Mt. Washington, N. H., both above and below the timber line, with brief notes.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON, 262D
MEETING, SATURDAY, MAY 16.

THE evening was devoted to the discussion of *The Fauna and Flora of the Islands off the Coast of Southern and Lower California, Including the Gulf of California*.

Dr. E. L. Greene discussed in brief the flora of the islands. The entire group, from Guadalupe, off the coast of Mexico, lying a hundred miles or more distant from the mainland, to those forming the channel of Santa Barbara and holding distances of only thirty and forty miles from the Californian shore, is a remarkable group among continental islands, as presenting in its flora so many points of divergence from that of the adjacent mainland. The islands of the Atlantic seaboard, even those lying farther out at sea than do any of those of the Californian coast, yield only such genera and species as are common on the continent. But in the case of the Mexico-Californian group there are not less than fifty good species already known which are absolutely peculiar to the islands; some of them representing even generic types, like *Lyonothamnus*, consisting of two very distinct species—one a large shrub, the other a small tree—with no very near relatives in any other part of the world. *Crossosoma*, another genus of shrubs, has one fine species indigenous to several islands, with none on the immediately neighboring mainland, though a second small and insignificant member of the genus occurs away beyond the continental mountain ranges, on the verge of the deserts of the distant interior. And this insular genus *Crossosoma* is almost more than a genus. It probably represents a natural order, some authors referring it to the Dilleniaceæ, the genera of which are all Australian and South American, others placing it provisionally in the Papaveraceæ, while in character it is different from either family. The most surprising case of entire divergence from continental flora is that of four very strongly marked species of *Lavatera*, which are scattered up and down the archipelago, while not a single species is indigenous to the American continent, either North or South, all the generic allies of these fine shrubs being of the flora of the Mediterranean region, with the exception of three or four, which are confined to remote and truly oceanic islands.

Another and negative point of divergence between the insular and mainland floras is the almost or quite total absence from the island of representatives of certain of the most prevalent mainland genera, such as *Ribes* *Lu-*